

Estimation of Genotoxic Exposures in Children with Neural Tube Defects in Shanxi, China

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Exposure of a fetus to genotoxic chemicals may produce a broad range of adverse outcomes ranging from premature birth and low birth weight to congenital abnormalities. The frequency of neural tube defects (NTDs) in Shanxi, China, is from five to ten times the rate observed in the United States. Data are being collected from birth hospitals in Shanxi, China. For the first six months of 2005, the incidence of neural tube defects in four hospitals in high-risk areas of Shanxi ranged from 7.9 to 24 per 1,000 births. Combustion of coal for heating and cooking are believed to result in exposure to polycyclic aromatic hydrocarbons (PAHs) and arsenic in homes. This ongoing genotoxicity study is collecting data to measure concentrations of PAHs in house dust. Levels of PAHs in plasma and DNA adducts in placenta have also been quantified. Carcinogenic PAH levels in dust collected from kitchen floors ranged from 5,000 to 56,000 ng/m². Placenta tissues from children born with NTDs were found to have significantly higher levels of the less polar, bulky DNA adducts when compared with matched controls (3.4 ± 1.3 per 10^9 nucleotides in case subjects and 1.1 ± 0.8 per 10^9 nucleotides in control subjects). The less polar DNA adducts may reflect a genetic sensitivity in selected children. Measurements of genetic polymorphisms are being conducted to investigate gene-environment interactions that may affect the level of DNA adducts. The existing data indicate that genotoxic compounds in the environment may have an influence on children's health in this region.

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